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Question Paper Code: 55702

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Mechanical Engineering

15UME502 - ENGINEERING MATERIALS AND METALLURGY

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Steels mainly contain iron and carbon. Under which of the following categories do they belong? CO1- R
(a) Ceramics (b) Polymer (c) Composites (d) Metallic Solid
2. The mixture of α -ferrite and cementite is called as _____. CO1- R
(a) Ledeburite (b) Pearlite (c) Austenite (d) Both a. and b.
3. What is the hardest phase of Fe-C system? CO2- R
(a) Graphite (b) Bainite (c) Martensite (d) Cementite
4. Hot working tool steels can be case hardened by the process of CO2- R
(a) Carburizing (b) Carbonitriding
(c) Nitriding (d) Induction Hardening
5. In which property, metals are better than ceramics? CO3- R
(a) Hardness (b) Toughness (c) Ductility (d) Yield Strength
6. Which of the following property is desirable for materials used in tools and machines? CO3- R
(a) Elasticity (b) Plasticity (c) Ductility (d) Malleability

7. Which of the following alloy is used in making aircraft structures CO4- R
- (a) Aluminium Alloy (b) Magnesium Alloy
(c) Brass (d) Bronze
8. _____ steel widely used for motor car crankshafts CO4- R
- (a) Nickel steel (b) Nickel-Chrome steel (c) Silicon steel (d) Chrome steel
9. PVC stands for CO5- R
- (a) Poly vinyl carbonate (b) Plastic very compact
(c) Polyvinyl chloride (d) Polythene vinyl chloride
10. In general, strongest polymer group is _____ CO5- R
- (a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers

PART – B (5 x 2= 10 Marks)

11. When a steel is called as cast iron CO1- R
12. Define the term hardenability CO2- R
13. Tell about fracture toughness CO3- R
14. Define and alloy CO4- R
15. What is composite material? CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Examine the various solid solution strengthening techniques in detail CO1- App (16)
- Or
- (b) Analyze the Iron-Carbide equilibrium diagram with neat sketch and also discuss the different phases and reactions of this system. CO1- App (16)
17. (a) With necessary sketches examine the transformation of steel with respect to time and temperature CO2 -App (16)
- Or
- (b) Explain any two methods of carburizing based on the process and mention its advantages and limitations. CO2- Ana (16)
18. (a) Explain the various types of fracture with necessary sketch. CO3- Ana (16)
- Or
- (b) Write down the procedure for preparing Charpy and Izod specimens for impact testing and also explain how testing is performed. CO3- Ana (16)

19. (a) Describe the properties and applications of the following CO4-U (16)
(i) HSLA steel
(ii) Tool steel

Or

- (b) Discuss any two copper base alloys. Give its composition, properties and uses. CO4- Ana (16)

20. (a) What are the different types of polymers? Explain any four types of polymers and its applications. CO5-U (16)

Or

- (b) State the need for ceramic materials and also explain the properties and applications of ceramic materials in various engineering fields. CO5-U (16)

